FYI
Fluor Your Information

In This Issue

*Special Edition: Projects*
*CS&I* ..... 3
*CP D&D* ..... 5
*Groundwater* ..... 6

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*A cask holding spent fuel consolidated from the 327 Building is lowered into the K East Basin in 1999. The fuel was subsequently removed from the basin, dried, and consolidated on the Central Plateau by Fluor Hanford's Spent Nuclear Fuel Project.*

# Spent fuel consolidated into dry storage

## A first in the DOE Complex

Fluor projects at Hanford have now consolidated and placed in dry storage nearly all of the irradiated (spent) fuel (SNF) that was stored on the site when Fluor Hanford began its contract in October 1996. Hanford was home to nearly 80 percent of the entire inventory of DOE's spent nuclear fuel – a total of 4.664 million pounds (2,332 tons), equivalent to the weight of more than 58 of the largest, fully loaded trucks regularly allowed on Washington state highways.. Moving and consolidating the seven distinct groups of fuel away from the Columbia River was a high-priority assignment to Fluor from the Department of Energy (DOE). Dry storage is considered preferable to wet storage because water can cause the fuel to deteriorate and pose the potential for the storage pools to leak.

"We're proud to say that this complicated work has nearly been completed," said George Jackson, FH's executive vice president. "We've consolidated over 98 percent of the spent fuel at Hanford into dry storage, and this achievement certainly improves the safety posture of the site, and also reduces costs. Storing the fuel in several different areas was not

*Spent fuel ... Continued on page 2*

***Spent fuel ...*** *(Continued from page 1)*
efficient, and wasn't making the best use of taxpayer dollars for cleanup. Fuel consolidation is one of the most important goals Fluor has accomplished in over 10 years at Hanford."

Jackson made particular note of the movement of some fuel in late December. One of the final collections of fuel -- 13 drums containing spent fuel from a test reactor that operated at the Oregon State University (OSU) -- was retrieved from a solid waste burial ground and moved to the 200 Area Interim Storage Area (ISA). The ISA, located about one-quarter mile west of the Canister Storage Building (CSB) in the 200 East Area, is one of the primary places where Fluor Hanford has been consolidating fuel. The ISA comprises reinforced concrete pads and a compacted gravel pad surrounded by a chain-link fence, with perimeter lighting.

*A cask holding spent nuclear fuel from the FFTF is carefully placed on the 200 Area ISA in June 2004.*

The OSU fuel constituted a miniscule fraction of the fuel at Hanford. It is being stored at the ISA inside a "Rad-Vault" enclosure. The Rad-Vault is a concrete, vertical cylinder with steel reinforcement, nearly 10 feet tall. It provides environmental protection, supplemental shielding, and resistance to the hazards of natural phenomena.

**K Basins spent fuel**

The 2,300 tons (2,100 metric tons [MT]) of SNF stored in the K Basins was the largest and most significant group of fuel moved to the Central Plateau. Fluor Hanford managed the high-priority SNF Project that removed just over 4.65-million pounds of fuel from a historic reactor area in four years, 2000-2004. The SNF Project also dried the fuel and placed all of it in safe, dry, interim storage in central Hanford, nine miles from the Columbia River, effectively neutralizing the risks formerly posed by the decaying fuel.

*In 2002, a truck transport bearing dried spent nuclear fuel from the historic Shippingport reactor leaves T Plant on its way to the Canister Storage Building.*

Consolidating the nearly 105,000 irradiated, solid metal uranium fuel assemblies in the Central Plateau's CSB marked a cornerstone event in Hanford's long farewell to arms. However, many people do not realize that the fuel moved from the K Basins represented a consolidated collection of defense fuel that had been moved to the K Basins from several locations: the PUREX (plutonium uranium extraction) Plant during its deactivation in the 1990s , the spent fuel basins and burial grounds of some of Hanford's other reactors, and the 327 Radiometallurgy Building.

As spent fuel was found during the "cocooning" projects at the C, D, DR, H and F reactors during 1995-2004, it placed in the K Basins for temporary storage. Further, in 1999, the SNF Project relocated just over half a ton of fuel from hot cells (special, enclosed work areas for radioactive materials) in the 327 Building into the K East Basin. This fuel was from the spent fuel basins at both the N and K Reactors , some of which had been used to study fuel characteristics early in the SNF Project.

**Other spent fuel at Hanford**

The next largest collection of spent fuel consisted of 72 fuel assemblies (about 17.6 tons or 16 MT) from the electrical production reactor at Shippingport, Pa. This non-defense, uranium oxide fuel was irradiated as part of a research program that began in 1965. It was shipped to the Hanford Site during 1978-79, and placed in underwater storage racks in a pool cell at T-Plant to await dissolving and reprocessing in PUREX. However, when reprocessing operations ended at Hanford this fuel was left in its original condition In 2004, Fluor Hanford completed a project that dried the 72 large, long fuel assemblies and moved them into safe storage in the CSB.

About 12 tons (11 MT) of spent fuel were stored in the 400 Area when the Fast Flux Test Facility (FFTF) shut down. Nearly 375 fuel elements were irradiated in experimental work at FFTF between 1980 and 1992. The majority of the fuel was mixed oxide (plutonium oxide-uranium oxide), although some carbides and some uranium-zirconium alloys were included.

Since 2004, Fluor has worked to package this fuel into Interim Storage Casks (ISCs) and move it to the 200 Area ISA. A small fraction of FFTF's spent fuel was shipped to the protected area at the Plutonium Finishing Plant's (PFP). Today, over 97 percent of the fuel from FFTF has been consolidated in Central Hanford. A small amount of irradiated fuel remains at FFTF while plans are being made to ship it to the Idaho National Laboratory (INL) site. This fuel had been irradiated in experiments done at FFTF for INL.

In 2002, Fluor's SNF Project completed another difficult effort to remove seven light water reactor commercial fuel assemblies from Hanford's 324 Building and place them in storage on the 200 Area

***Spent fuel ...*** *Continued on page 8*

***Spent fuel ...*** *(Continued from page 2)*

ISA. These assemblies had been brought to the site in the 1980s and examined as part of DOE's spent-fuel-repository studies and another research program.

Their move was especially challenging because the fuel, approximately 2.3 tons (2 MT), consisted of very long assemblies (nearly 15 feet long in some cases) inside the 324 Building's B Cell and moving the large, heavy casks out of cell airlock proved extremely challenging – especially since workers wore full personal protective clothing and masks.. The six casks holding the fuel are now stored on the ISA inside heavy containers certified by the International Standards Organization (ISO).

The final collection of spent fuel at Hanford consisted of 101 elements of TRIGA fuel (Neutron Radiography Facility [NRF] Training, Research and Isotope Production, General Atomics) containing enriched uranium-zirconium hydride. The fuel had been slightly irradiated in a small reactor in the 308 Fuels Development Laboratory, providing neutron radiography and testing to support the development of fuel for FFTF in the late 1970s and 1980s. In 1996, the fuel was packaged into lead-lined containers and casks, and placed inside a Rad-Vault enclosure on the 400 Area ISA. It was relocated to the 200 Area ISA in 2002.

For the past 13 years, Roger McCormack, site-wide SNF project manager, has guided the consolidation of spent fuel at Hanford. Today, he says, he has a "real sense of accomplishment. The fuel consolidation program has allowed many other Hanford programs to meet Tri-Party Agreement commitments and achieve other critical goals by taking special nuclear material out of their buildings and allowing them to proceed with D&D work. This effort has eliminated substantial costs to maintain storage at these facilities and provided a safer configuration for storing this material. It's an accomplishment that hasn't garnered a lot of publicity, but it's one we should be proud of."

**Michele Gerber, Communications**